EBGN 455/555 – Linear Programming
Fall 2013

Syllabus

Instructor: Dr. Steffen Rebennack, Engineering Hall (EH) 310, srebenna@mines.edu, 303-273-3925.

Class: Tuesdays and Thursdays 08:00 – 09:15 AM in Green Center (GC) 265.

Office hours: Mondays 02:30 – 06:00 PM and Tuesdays 04:00 - 06:00 PM in Engineering Hall (EH) 310, and by appointment.

Teaching Assistant (TA): Rita Risting, rristing@mines.edu, Brown Hall (BB) 280K desk 2.

TA office hours: Mondays 01:30 – 2:30 PM.

Webpage: The webpage is hosted on Blackboard. (https://blackboard.mines.edu/webapps/login/).

Textbook: *Linear Programming and Network Flows*, by M.S. Bazaraa, J.J. Jarvis and H.D. Sherali, 4th edition, Wiley.

Software: GAMS (you may use AMPL if you prefer to do so).

Rules:

- Come to class in time.
- Be attentive, participate and focused.
- Respect your fellow students.
- Follow the honor code.
- If you need to see me outside the office hours, please make an appointment via e-mail.
- You may use the "Discussion Board" on Blackboard to discuss homework assignments; if I catch you posting answers, you loose 10% of the corresponding homework assignment.
- Try to see the TA before you see me.
- If you have comprehensive questions, please see the TA or me, but do not write an e-mail.

Homeworks: There will be weekly or biweekly homeworks, usually due on a Tuesday at the beginning of class. Teamwork is encouraged, but submission has to be individual. You must follow the honor code.

Grade evaluation:

	EBGN 455	EBGN 555
Homework	25%	25%
Class participation	5%	5%
Midterm	30%	20%
Final	40%	25%
Project	–	25%

Note: no make-up is given for the midterm exam, the final will count for 70% for EBGN 455 and 45% for EBGN 555, respectively, of your grade if proper documentation is available.

The final exam will be comprehensive and will cover all the material.

Class attendance and participation will count for 5% of the grade. Your participation in the classroom will also be rewarded. You can participate by asking meaningful questions, by providing good answers to questions that I ask or by commenting in any other meaningful manner.

The final (letter) grade will be determined by considering absolute scores. Specifically, the final grades will be given according to the following table:

93-100%	A
90-92%	At least A-
87-89%	At least B+
83-86 %	At least B
80-82%	At least B-
77-79 %	At least C+
73-76 %	At least C
70-72 %	At least C-

Exam dates

- Mid-Term: October 24th in class
- Final: TBA

Hints for good grade:

- Come to each class.
- Participate in class.
- Solve each homework first alone and then discuss your solution in groups.
- Start early on the class project, if applicable

Class contents:

0 Introduction
  (a) Modeling and examples
  (b) Graphical Solution Method (two-dimensions)
  (c) Sensitivity Analysis (Graphical)
  (d) Alternative Optimal Solutions, Infeasibility, Unboundedness
  (e) GAMS

I Fundamentals
  (a) The Linear Programming problem
  (b) Standard and canonical form
  (c) Convex sets and convex functions
  (d) Polyhedral sets and their representation
  (e) Linear Programming and convexity

II The Simplex Method
  (a) Towards the Simplex Method
  (b) The basic Simplex Method
  (c) Finite convergence (in the absence of degeneracy)
  (d) Block pivoting
  (e) Tableau format

III Starting solution and convergence
   (a) The initial basic feasible solution
   (b) The Two-Phase Method
   (c) The Big-M Method
   (d) Degeneracy
   (e) Cycling and preventing rules
   (f) The revised Simplex Method
   (g) Complexity of the Simplex Algorithm (Klee-Minty)

IV Duality and Sensitivity Analysis
   (a) Dual problem
   (b) Primal-dual relationship
   (c) The Dual Simplex Method
   (d) The Primal-Dual Method
   (e) Sensitivity analysis
   (f) Parametric analysis

V Open problems is Linear Programming